Appendix 2:

Environmental Enrichment (Behavioral Management) of Nonhuman Primates

Introduction

A major objective of the NIH Animal Care and Use Program is to promote the humane care and use of animals in biomedical research. It is hard to discuss the humane care and use of animals without concurrently discussing and balancing animal well-being with the goals of the biomedical research. *The Guide for the Care and Use of Laboratory Animals* (NRC, 2011), hereafter, *The Guide*, is one of the primary references regarding the implementation and management of the NIH Animal Care and Use Program. The *Guide* promotes the humane care and use of laboratory animals and strives to enhance animal well-being, the quality of research, and the advancement of scientific knowledge that is relevant to both humans and animals.

A critical component of the humane care of primates is attention to their microenvironment, including the primary enclosure where the animals are housed (NCR 2011). Over the past decade the provision of an enriched, more complex, microenvironment has been demonstrated to promote the well-being of a variety of species used in biomedical research, including primates. Today, the provision of environmental enrichment to primates has become an integral component of most comprehensive animal care programs within the United States and Europe (Baker et al 2007; Coleman et al 2012). Therefore it is the intent of this document to establish best practices for enrichment programs on the NIH campus. Coleman et al (2012) provide a comprehensive overview of the relative issues regarding the effectiveness and usefulness of a behavioral management program for primates.

Environmental Enrichment Strategies

Social housing, Structural enrichment and Activity. Long developmental periods, high intelligence, and complex social structures are common characteristics of all nonhuman primate species and set them apart from most other biological groups (NRC 1998; NIH DVR Enrichment Plan, 2012). The goal of enrichment is to provide the animals with the option and ability to engage in species typical behavior through the use or application of structural, social, or activity based opportunities. Providing these options will ultimately address the physical, physiologic and behavioral needs of the primates. Housing should account for the social needs of the animals. Animals should be housed in stable pairs or groups unless excluded by experimental or veterinary concerns. Providing species typical social housing does not preclude participation in experimental procedures although appropriate precautions should be implemented when working with co-housed non-human primates (Reinhardt, 1989) *The Guide* specifically recommends limiting single housing to the minimal amount of time necessary and should be the exception rather than the default value. If single housing is required, methods should be explored if possible where animals can engage in periodic release into larger enclosures for enhanced structural contact or appropriate activities (Wolff & Ruppert, 1991). Examples of structural enrichment for primates may include but are not limited to perches, nest boxes and swings. Additional components of the home cage specifically designed to provide enrichment may include tunnels or grooming contact panels which connect adjacent cages and allow for the expression of species typical behavior (Crockett et al, 1997). Alternatively, behavioral

testing can be seen as a dynamic activity as it provides monkeys opportunities to engage in mentally and physically stimulating procedures outside of the home cage

Procedural habituation and training. *The Guide* encourages working with primates to habituate them to routine experimental procedures. Training primates through the application of operant conditioning principles may facilitate cooperation in these procedures. Reinhardt (1997) has provided a comprehensive review of the training possibilities for nonhuman primates.

Environmental enrichment is one component of an Institutional Animal Care and Use Committee (IACUC) approved behavioral management program and should be provided in a consistent manner across the animal program. In addition, enrichment programs should be reviewed by the IACUC, researchers, and veterinarian on a regular basis to ensure that they are beneficial to animal well-being and consistent with the goals of animal use. (Guide, Page 53, Weed & Raber, 2005)

Summary

Environmental enrichment strategies for primates have been widely adopted across the NIH Intramural Research Program, the United States, and Europe (Coleman et al 2012), to address the welfare of primates used in biomedical research. Standardized strategies have been applied to a wide range of research situations with varying research goals without adverse results. All NIH programs must have an environmental enrichment plan for primates used within their program. Enrichment plans should delineate the standardized approach to be used within the program. Programs choosing to go above this minimum must consider the introduction of additional research variables between their animals and animals housed in different facilities and programs. In all situations, the decision regarding whether or not to enhance the microenvironment of primates housed in the intramural program at NIH ultimately rests with the Principal Investigator and the protocol review process in each Institute or Centers' IACUC. Valid reasons for either enhancing or limiting the microenvironment should be provided to the ACUC during initial protocol review.

References

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